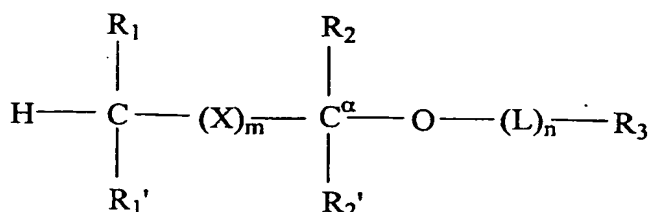


## WHAT IS CLAIMED IS:

1. A phosphonate compound having the structure:



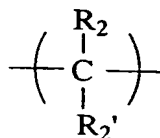
wherein:

$\text{R}_1$  and  $\text{R}_1'$  are independently -H, optionally substituted  
-O(C<sub>1</sub>-C<sub>24</sub>)alkyl, -O(C<sub>1</sub>-C<sub>24</sub>)alkenyl, -O(C<sub>1</sub>-C<sub>24</sub>)acyl, -S(C<sub>1</sub>-C<sub>24</sub>)alkyl,  
-S(C<sub>1</sub>-C<sub>24</sub>)alkenyl, or -S(C<sub>1</sub>-C<sub>24</sub>)acyl, wherein at least one of  $\text{R}_1$  and  $\text{R}_1'$  are  
not -H, and wherein said alkenyl or acyl optionally have 1 to about 6 double  
bonds,

$\text{R}_2$  and  $\text{R}_2'$  are independently -H, optionally substituted  
-O(C<sub>1</sub>-C<sub>7</sub>)alkyl, -O(C<sub>1</sub>-C<sub>7</sub>)alkenyl, -S(C<sub>1</sub>-C<sub>7</sub>)alkyl, -S(C<sub>1</sub>-C<sub>7</sub>)alkenyl,  
-O(C<sub>1</sub>-C<sub>7</sub>)acyl, -S(C<sub>1</sub>-C<sub>7</sub>)acyl, -N(C<sub>1</sub>-C<sub>7</sub>)acyl, -NH(C<sub>1</sub>-C<sub>7</sub>)alkyl,  
-N((C<sub>1</sub>-C<sub>7</sub>)alkyl)<sub>2</sub>, oxo, halogen, -NH<sub>2</sub>, -OH, or -SH;

$\text{R}_3$  is a phosphonate derivative of a pharmacologically active  
compound linked to a functional group on optional linker L or to an available  
oxygen atom on  $\text{C}^\alpha$ ;

X, when present, is:



L is a valence bond or a bifunctional linking molecule of the formula

-J-(CR<sub>2</sub>)<sub>t</sub>-G-, wherein t is an integer from 1 to 24, J and G are independently -O-, -S-, -C(O)O-, or -NH-, and R is -H, substituted or unsubstituted alkyl, or alkenyl;

5                   m is an integer from 0 to 6; and  
                  n is 0 or 1.

2.           The phosphonate compound according to claim 1, wherein R<sub>3</sub> is a bisphosphonate.

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3.           The phosphonate compound according to claim 2, wherein the bisphosphonate is alendronate, etidronate, tiludronate, ibandronate, EB-1053, pamidronate, olpadronate, amino-olpadronate, clodronate, or risedronate.

15           4.           The phosphonate compound according to claim 1, wherein R<sub>3</sub> is a phosphonate derivative of an antiviral nucleoside.

5.           The phosphonate compound according to claim 4, wherein said phosphonate derivative is adefovir, cidofovir, cyclic cidofovir, or tenofovir.

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6.           The phosphonate compound according to claim 4, wherein said phosphonate derivative is a derivative of azidothymidine (AZT).

25           7.           The phosphonate compound according to claim 1, wherein R<sub>3</sub> is a phosphonate derivative of an anti-neoplastic nucleoside.

8.           The phosphonate compound according to claim 7, wherein said phosphonate is a derivative of cytosine arabinoside, gemcitabine, 5-fluorodeoxyuridine riboside, 5-fluorodeoxyuridine deoxyriboside,  
30   2-chlorodeoxyadenosine, fludarabine, or 1-β-D-arabinofuranosyl-guanine.

9.           A pharmaceutical composition comprising a phosphonate compound according to claim 1 and a pharmaceutically acceptable carrier therefor.

10. A method for treating osteoporosis in a mammal, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.
- 5 11. A method for augmenting bone mineral density, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.
- 10 12. A method for preventing osteoblast and osteocyte apoptosis in a mammal, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.
- 15 13. A method for treating a viral infection in a mammal, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.
- 20 14. A method for treating a growing neoplasm in a mammal, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.
15. A method for modulating cell proliferation, said method comprising administering to a subject in need thereof an effective amount of a phosphonate compound according to claim 1.